
Method for Decellularizing Skeletal Muscle Without Detergents or Proteolytic Enzymes.

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Public Summary:

Scientific Abstract:

Decellularized skeletal muscle is a promising model that can be used to study cell-matrix interactions and changes that occur in muscle extracellular matrix (ECM) in myopathies and muscle wasting diseases. The goal of this study is to develop a novel method to decellularize skeletal muscle that maintains the native biochemical composition and structure of the ECM. This method consists of sequential incubation of mouse tibialis anterior muscles in latrunculin B, high ionic strength salt solution, and DNase I and avoids use of proteases or detergents that degrade the ECM. Characterization of the decellularized muscles using hematoxylin and eosin staining along with DNA quantification suggested complete removal of DNA, whereas biochemical analyses indicated no loss of collagens and only a slight reduction in glycosaminoglycans. Western blot analysis of decellularized tissues showed removal of the vast majority of the contractile proteins actin and myosin, and morphological analysis using scanning electron microscopy suggested removal of myofibers from decellularized muscle tissues. Passive mechanical testing of decellularized muscle bundles revealed the typical nonlinear behavior, similar to that of intact muscle. Together, these results suggest that the protocol developed successfully decellularizes skeletal muscle without altering its composition and mechanical function.

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